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focus ion beam

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The **Focused Ion Beam** (FIB) is a scanning microprobe similar to a Scanning Electron Microscope (SEM). In both case a **beam**, a 30 keV Ga+ **ion beam** in the case ...

[www.faculty.virginia.edu/teamhull/project%20introductions/kubis-revised1.htm](http://www.faculty.virginia.edu/teamhull/project%20introductions/kubis-revised1.htm) - 15k - [Cached](#) - [Similar pages](#)

**Focused Ion Beam (FIBs)**

Single-column FIB systems image material surfaces by bombarding them with ions (typically Gallium).

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**FIB - Focused Ion Beam**

**Focused Ion Beam** (FIB) techniques are used in a variety of applications. In terms of failure analysis, FIB techniques are commonly used in high ...

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**Fibics FIB Basics**

Introduction: **Focused Ion Beam** Systems. **Focused ion beam** (FIB) systems have been produced commercially for approximately ten years, primarily for large ...

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**Micro-Engineering and Nano-Technology: Role of Focused Ion Beam ...**

Investigation into the Role of **Focused Ion Beam** (FIB) Technology in the Fabrication of MEMS devices. Researcher: Jason Teng. Project description ...

[www.micro-nano.bham.ac.uk/teng.htm](http://www.micro-nano.bham.ac.uk/teng.htm) - 14k - [Cached](#) - [Similar pages](#)

**Focused Ion Beam**

In the **focused ion beam** system (FIB), a highly **focused ion beam** is aimed at a target area on the sample. As the **beam** scans the surface of the sample, ...

[www.fke.tuwien.ac.at/silizium/alouis/FIB\\_processing.htm](http://www.fke.tuwien.ac.at/silizium/alouis/FIB_processing.htm) - 7k - [Cached](#) - [Similar pages](#)

**CMS—Dual Beam Focused Ion Beam Capability**

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# Introduction Focused Ion Beam

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The Focused Ion Beam (FIB) system uses a  $\text{Ga}^+$  ion beam to raster over the surface of a sample in a similar way as the electron beam in a scanning electron microscope. The generated secondary electrons (or ions) are collected to form an image of the surface of the sample.

The ion beam allows the milling of small holes in the sample at well localized sites, so that cross-sectional images of the structure can be obtained or that modifications in the structures can be made.

The applications of FIB include :

- cross-sectional imaging through semiconductor devices (or any layered structure)
- modification of the electrical routing on semiconductor devices
- failure analysis
- preparation for physico-chemical analysis
- preparation of specimens for transmission electron microscopy (TEM)
- micro-machining
- mask repair
- non-semiconductor applications

Further information on FIB.

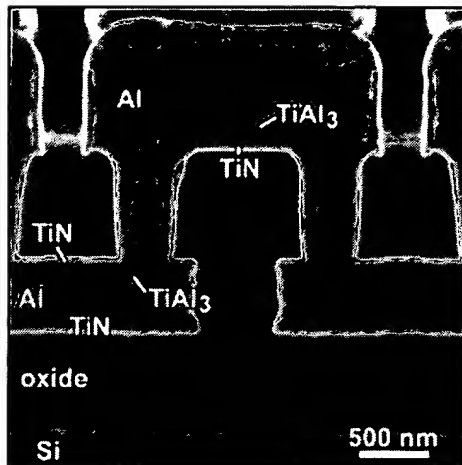
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Contact : European FIB Users Group



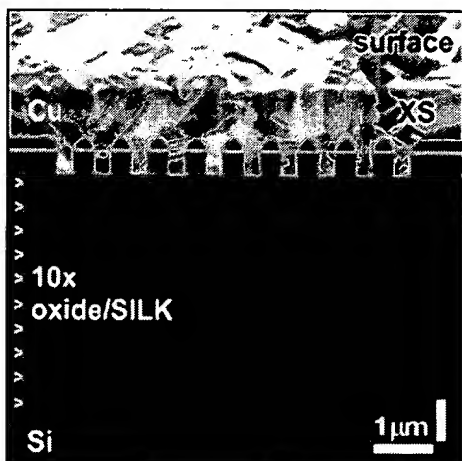
# Examples of FIB applications

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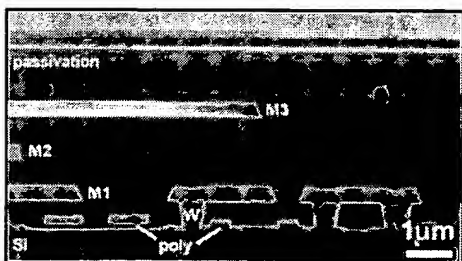
FIB cross-section through a hot Al via chain

© IMEC



Cross-sectional FIB image through a Cu damascene trench structure in a SILK (Dow Chemical) dielectric on top of a stack of 10 dual-layers oxide hard mask/SILK.

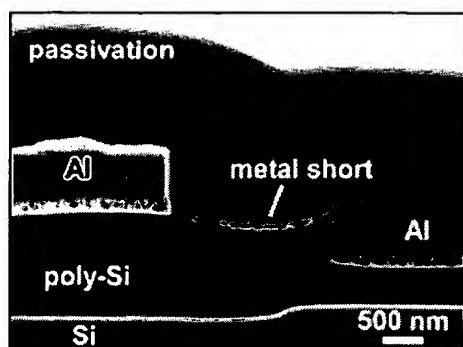
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FIB cross-section through a 4-layer metal device.

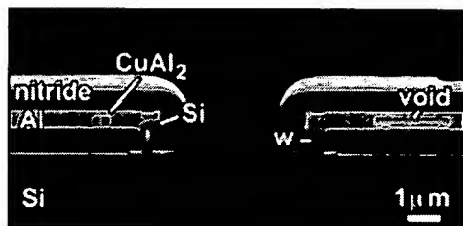
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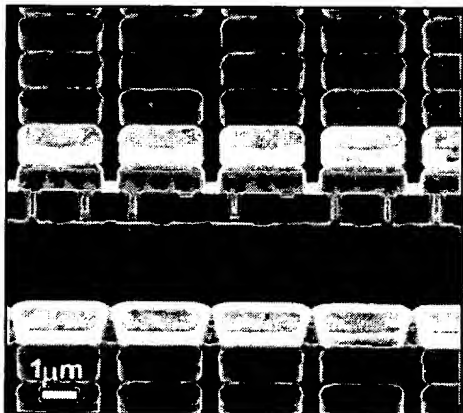
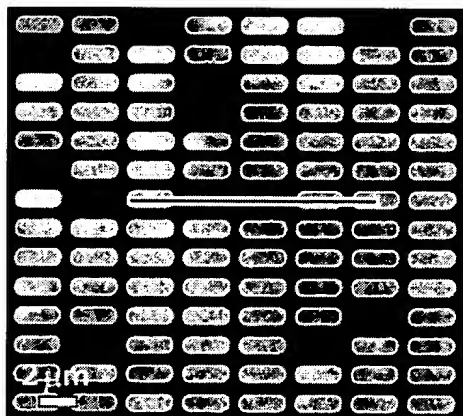
Cross-sectional FIB image through a failure site showing the presence of a metal short between the two Al lines.

© IMEC



Electromigration test structure showing the formation of a void on the cathode and the accumulation of Si and Cu on the anode side.

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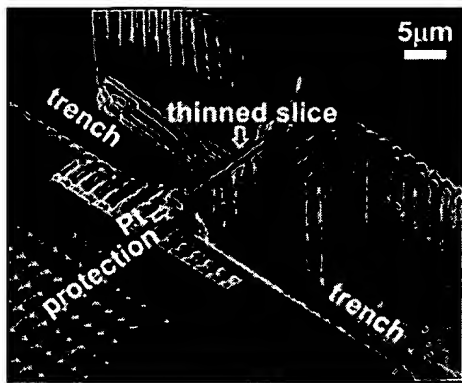


Voltage contrast reveals open via positions in a contact chain structure. The cross-section image at the position of the line shows too undep etching of the vias.

© IMEC

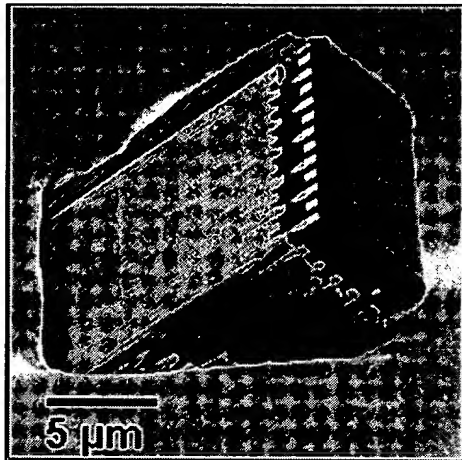


Tilted view of a specimen for transmission



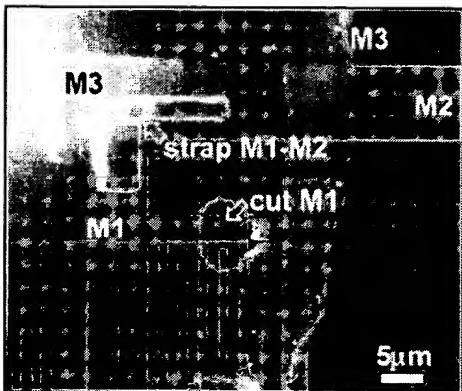
electron microscopy prepared by the FIB trench milling procedure through a 5-layer metal via chain test structure.

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Liftout sample of a DRAM. The sample was cut out of the wafer with FIB, transferred to a carrier with a micromanipulator and glued tight by heating. After further FIB polishing two perpendicular sides of the sample can be imaged. This technique allows wet chemical preparation like lift-off or staining and high-resolution imaging in the SEM.

© Infineon



Modifications on a three-layer metal structure. The layout is overlaid on the top view FIB image taken after the modification (M1 pink, M2 blue, M3 yellow).

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